HEALTH POLICY AND SYSTEMS

Average Hospital Length of Stay, Nurses’ Work Demands, and Their Health and Job Outcomes

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Key words
Health, length of stay, nurse, outcome, workload.

Abstract

Purpose: To examine the relationship between average hospital length of stay (LOS) of nursing units and work demands perceived by nurses, and between work demands and nurses’ health and job outcomes.

Design: A cross-sectional study using nurse survey data collected in a tertiary university hospital in Seoul, South Korea, in 2013 including 746 staff nurses working on 36 general, oncology, or intensive care units.

Methods: Each unit’s average LOS was categorized as short (1st quartile), medium (2nd and 3rd quartiles), or long (4th quartile). Work demands (i.e., quantitative demands, work pace, and emotional demands), and nurses’ health and job outcomes were measured using the Copenhagen Psychosocial Questionnaire II. Their relationships were examined by multiple linear or logistic regression analyses with multilevel modeling.

Findings: The nurses reported high mean scores of work demands and poor health and job outcomes, compared with other occupations. The nurses working on units with a short or medium (vs. long) LOS perceived higher quantitative and emotional demands, and a higher work pace. Greater quantitative and emotional demands were associated with poor self-rated health, greater sleeping troubles, work–family conflict, stress and burnout, lower job satisfaction, and a greater intent to leave. A higher work pace was also significantly related to greater work–family conflict.

Conclusions: A shorter LOS was associated with higher work demands, and higher work demands were associated with worse nurse outcomes. Thus, excessive work demands should be avoided to prevent nurses’ health and job outcomes from deteriorating.

Clinical Relevance: Nurse managers need to monitor the impacts of reducing LOS on work demands and nurse outcomes and request additional nurses to meet increasing work demands.

The average hospital length of stay (LOS) is one of the most commonly used measures of resource utilization and efficiency in providing hospital services. The LOS is influenced by factors including patient diagnoses and procedures, hospital ownership, the competitive healthcare environment, and payment systems. In particular, the prospective payment system (PPS) has strong financial incentives for hospitals to reduce the LOS. The United States has implemented PPSs using diagnosis-related groups (DRGs) since the 1980s and has reported resulting reductions in the hospital LOS (Aiken, 2008). The Korean government introduced a DRG payment
system for eight (later seven) disease categories in 2002 on a voluntary basis and made it mandatory for all hospitals as of July 1, 2013. Extending the DRG payment approach to other disease groups has been recommended in Korea to further reduce the hospital LOS and, consequently, hospital costs (Jones, 2010).

Reductions in the LOS have been reported to directly influence nurse workloads and work demands. Aiken (2008) argued that PPSs and other incentives to reduce the hospital LOS had been detrimental to nurses because more complex care is compacted into fewer days. When the LOS becomes 1 day shorter, the patient admitted as a result of the “saved day” would require more nursing care than the patient who would have been discharged on that day (Arndt & Skydell, 1985; Shamian, Hagen, Hu, & Fogarty, 1994). Reducing the LOS is also linked to higher patient turnover (inverse of LOS), which involves an increase in the numbers of admissions, transfers, and discharges; these procedures are known to be the most intensive periods in the hospital stay and thus increase patient care demands (Unruh & Fottler, 2006). Knauf, Ballard, Mossman, and Lichtig (2006) have reported that nursing intensity weight scores were usually highest on the day of admission or surgery. Therefore, a shorter LOS and higher patient turnover increase work demands and consequently require more nursing staff to meet increasing patient care needs.

Increased work demands due to a shorter LOS are known to influence nurses’ health and job outcomes. In international comparisons of nurse burnout, researchers have suggested that the highest rates of burnout were generally found among nurses in countries with a shorter LOS (Aiken, 2008; Poghosyan, Aiken, & Sloane, 2009). In systematic reviews, excessive workloads and work demands were associated with increases in nurse job dissatisfaction, intent to leave, and turnover (Hayes et al., 2012; Lu, Barriball, Zhang, & While, 2012). Work overload was also related to increased sleep impairment, stress, fatigue, and work–family conflict (Winwood & Lushington, 2006; Yildirim & Aycan, 2008).

Despite these impacts of the LOS on nurse work demands and job outcomes, nurse executives and managers may overlook the influence of LOS on the work environments of their nursing department and units. They need to analyze how the average LOS has changed hospital-wide and on specific units over time, and how it has influenced the level of work intensity. The results of this analysis could provide a justification to hospital administrators for increasing the number of nurses in the face of increasing nursing intensity and workloads even when there have been few changes in the number of beds and occupancy rate.

The purpose of this study was to examine (a) the relationship between the average hospital LOS of nursing units and work demands perceived by nurses working on those units and (b) the relationship between work demands and nurses’ health and job outcomes.

Conceptual Model

This study was guided by a conceptual model including two steps: examining relationships (i.e., LOS–work demands and work demands–nurse outcomes). For the first step, the average LOS of the nursing units was thought to be likely to influence the work demands perceived by nurses working on the corresponding units. The work demands consisted of quantitative demands, work pace, and emotional demands, based on the construction of the second version of the Copenhagen Psychosocial Questionnaire (COPSOQ II; Pejtersen, Kristensen, Borg, & Bjorner, 2010). For the second step, work demands were expected to impact two health outcomes (self-rated health and sleeping troubles) and five job outcomes (work–family conflict, stress, burnout, job satisfaction, and intent to leave). The type of nursing units was included in the model under the assumption that it would reflect the characteristics of patients and nursing care. Nurse characteristics were also expected to influence nurses’ perceptions of work demands and nurse outcomes.

Study Design

This study was designed as a cross-sectional study that examined the relationships among the average LOS of nursing units, work demands, and health and job outcomes, using nurse survey data collected between January 29 and February 6, 2013.

Study Sample

The original nurse survey included all of the staff nurses working on five types of nursing units (i.e., general units, oncology units, intensive care units [ICUs], outpatient departments, and operating rooms) in a tertiary university hospital located in Seoul, the capital of South Korea. A total of 1,027 nurses on 48 nursing units completed the survey, with a 95.2% response rate. For the current study, nurses on the units where the average LOS was inappropriate to compute (e.g., outpatient departments and operating rooms) were excluded. The sample used in the present study consisted of 746 staff nurses working on 36 nursing units. The number of nurses completing the questionnaire per nursing unit ranged from 9 to 42 nurses; the response rates by nursing unit ranged from 78.9% to 100%, with an overall response rate of 95.3%.
**Table 1. Characteristics of Nurses and Nursing Units**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Nursing unit</th>
<th>Nurse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year), M ± SD</td>
<td>(n = 36)</td>
<td>(n = 746)</td>
</tr>
<tr>
<td>Female, n (%)</td>
<td>728 (97.6)</td>
<td></td>
</tr>
<tr>
<td>Married, n (%)</td>
<td>105 (14.1)</td>
<td></td>
</tr>
<tr>
<td>Baccalaureate or higher (vs. diploma), n (%)</td>
<td>548 (73.8)</td>
<td></td>
</tr>
<tr>
<td>Years worked as an RN, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;3</td>
<td>309 (41.5)</td>
<td></td>
</tr>
<tr>
<td>3–5</td>
<td>260 (34.9)</td>
<td></td>
</tr>
<tr>
<td>≥6</td>
<td>175 (23.5)</td>
<td></td>
</tr>
<tr>
<td>M ± SD</td>
<td>3.98 ± 3.84</td>
<td></td>
</tr>
<tr>
<td>Type of nursing unit, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General units</td>
<td>18 (50.0)</td>
<td>296 (39.7)</td>
</tr>
<tr>
<td>Oncology units</td>
<td>11 (30.6)</td>
<td>246 (33.0)</td>
</tr>
<tr>
<td>Intensive care units</td>
<td>7 (19.4)</td>
<td>204 (27.3)</td>
</tr>
<tr>
<td>Length of stay, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short (1st quartile)</td>
<td>10 (27.8)</td>
<td>205 (27.5)</td>
</tr>
<tr>
<td>Medium (2nd and 3rd quartiles)</td>
<td>17 (47.2)</td>
<td>333 (44.6)</td>
</tr>
<tr>
<td>Long (4th quartile)</td>
<td>9 (25.0)</td>
<td>208 (27.9)</td>
</tr>
<tr>
<td>M ± SD</td>
<td>12.7 ± 11.8</td>
<td></td>
</tr>
</tbody>
</table>

Note: The average length of stay of each unit was categorized into three groups: shorter (1st quartile, <6 days), medium (second and third quartiles, 6–15 days), and longer (fourth quartile, ≥16 days).

**Measures**

The nursing units were grouped into three categories (general, oncology, and ICUs). The average LOS of each unit for the month of January 2013 was categorized into one of three groups: short (first quartile, <6 days), medium (second and third quartiles, between 6 and 16 days), and long (fourth quartile, 16 days or longer; **Table 1**).

Nurses’ work demands and health and job outcomes were measured using nine dimensions of the medium-sized COPSOQ II (Pejtersen et al., 2010) and a single item about intent to leave the hospital within a year (yes or no). The number of items for each dimension is presented in **Table 2**. The reason for using the COPSOQ II was that it has been utilized in various occupations and thus enables comparing findings between nurses and other occupations. The COPSOQ has also been used in examining nurses’ psychosocial work environment (Aust, Rugulies, Skakon, Scherzer, & Jensen, 2007; Li et al., 2010). In Korea, the COPSOQ was used in a recent study of office workers (June & Choi, 2013).

Permission to use the COPSOQ II was obtained from the National Research Centre for the Working Environment in Denmark. Based on the Korean-language version developed by June and Choi (2013), translation from English to Korean and back-translation were performed until the original and back-translated versions had equivalent meanings. Each item was answered with either a 4- or 5-point scale and then scored from 0 to 100 (Pejtersen et al., 2010). Responses with a 4-point scale were converted into 0, 33.3, 66.7, and 100; those with a 5-point scale were converted into 0, 25, 50, 75, and 100. With this scoring method, higher scores indicated a higher nature of the dimension name; for example, higher scores represent higher job satisfaction and higher work–family conflict. The dimension score was computed as the mean of the item scores. If nurses had answered fewer than half of the questions in a dimension, the dimension score was treated as missing. Because self-rated health was measured with a single item, it was dichotomized into either poor or not, instead of using raw discrete scores. The Cronbach’s α of eight dimensions ranged from .663 to .894 (see **Table 2**).

Age, gender, marital status, academic degree, and years worked as a registered nurse (RN) were also collected as individual characteristics. Years of RN experience showed a skewed distribution and thus were categorized into three groups: less than 3 years, between 3 and 6 years, and 6 years or more.

**Data Analysis**

The mean and standard deviation of each dimension at the nursing unit level and individual level were found. The scores of individual nurses on the same nursing units were aggregated into the unit score. Self-rated health and intent to leave were analyzed by presenting the proportions of nurses who answered “poor” and “yes,” respectively. Relationships between the LOS and three dimensions of work demands were examined using multiple linear regression analysis, controlling for nurse characteristics and type of nursing unit. Multilevel modeling was employed to take into account that nurses were clustered in their units. Relationships of work demands to health and job outcomes were also examined using multiple linear or logistic (self-rated health and intent to leave) regression analyses with multilevel modeling, controlling for nurse characteristics and type of nursing unit.

**Ethical Considerations**

This study was approved by the Institutional Review Board of the Seoul National University College of Nursing. Survey envelope packages including survey instructions, consent forms, and a questionnaire were distributed to nursing units. To ensure confidentiality, the nurses were asked to seal their questionnaires immediately after completing them with a signed consent form. The datasets created for analysis did not include any personally identifiable information.
Table 2. Mean (M) and Standard Deviation (SD) for Work Demands, Health, and Job Outcomes at the Nurse and Nursing Unit Levels

<table>
<thead>
<tr>
<th>Nurse (n = 746)</th>
<th>Nursing unit (n = 36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of items</td>
<td>M ± SD</td>
</tr>
<tr>
<td>Work demands</td>
<td></td>
</tr>
<tr>
<td>Quantitative demands</td>
<td>4 .714</td>
</tr>
<tr>
<td>Work pace</td>
<td>3 .781</td>
</tr>
<tr>
<td>Emotional demands</td>
<td>4 .663</td>
</tr>
<tr>
<td>Health</td>
<td></td>
</tr>
<tr>
<td>Self-rated health as “poor,” %</td>
<td>1 20.3</td>
</tr>
<tr>
<td>Sleeping troubles</td>
<td>4 .894</td>
</tr>
<tr>
<td>Job outcomes</td>
<td></td>
</tr>
<tr>
<td>Work–family conflict</td>
<td>4 .831</td>
</tr>
<tr>
<td>Stress</td>
<td>4 .845</td>
</tr>
<tr>
<td>Burnout</td>
<td>4 .853</td>
</tr>
<tr>
<td>Job satisfaction</td>
<td>4 .770</td>
</tr>
<tr>
<td>Intent to leave (yes), %</td>
<td>1 32.3</td>
</tr>
</tbody>
</table>

Note: Variables were analyzed at the individual nurse and nursing unit levels. The scores of individual nurses on the same nursing units were aggregated into the unit score.

Results

Table 1 presents the characteristics of 746 nurses working on 36 nursing units included in the sample. The mean age was 27.3 years; 97.6% were female and 14.1% were married. About three quarters held a baccalaureate or higher degree. They had worked as an RN for 4 years on average, and 41.5% had worked less than 3 years as an RN. Because age and years of RN experience were highly correlated with each other (Pearson correlation coefficient = .908; p < .001), only years of RN experience was included in further analyses. The nursing units consisted of general units (50%), oncology units (30.6%), and ICUs (19.4%). The mean of the average LOS for each of the 36 units was 12.7 days. Nursing units with a short (1st quartile, shorter than 6 days), medium (2nd and 3rd quartiles, 6 to 15 days), and long (4th quartile, 16 days or longer) LOS accounted for 27.8%, 47.2%, and 25%, respectively, of the total group of units. Because two nursing units in the short LOS category had the same LOS (5.8 days), the units did not have the expected distribution of 25%–50%–25%.

Individual and Unit-Level Variations in Work Demands, Health, and Job Outcomes

Table 2 presents the mean scores and standard deviations for work demands, health, and job outcomes at the individual nurse and nursing unit levels. High mean scores were found in work pace (77.8), work–family conflict (73.5), and burnout (71.1). One fifth rated their health as poor, and one third reported an intent to leave the hospital within a year. Nurses’ individual scores were distributed with almost a full range from 0 to 100.

When the nurses’ individual scores were averaged at the unit level, considerable variations were still found among the units. In particular, quantitative demands and work–family conflict had the greatest differences of 30 and 31.4 points, respectively, between the lowest and highest units. Large variations were also found in the proportions of nurses reporting poor health and intent to leave among nursing units. Whereas no nurses rated their health as poor in a certain unit, 42.1% of nurses working on another unit did. The proportion of nurses with an intent to leave also ranged from 5.6% to 68.4%.

Relationship Between the Average Length of Stay and Work Demands

Results from multilevel analysis on the relationship between the LOS and work demands are presented in Table 3. After the nurse characteristics and type of nursing units were controlled for, LOS was significantly associated with all three dimensions of work demands. Nurses working on units with a short or medium LOS reported higher quantitative and emotional demands, and a higher work pace than those working on a unit with a long LOS. Greater regression coefficients were found in quantitative demands followed by work pace. Working on units with a short (vs. long) LOS was associated with higher quantitative demands by 10.2 points (p = .002), a higher work pace by 9.5 points (p < .001), and higher emotional demands by 6.4 points (p = .002). Nurses working on units with a medium (vs. long) LOS were related to a 9.9-point higher quantitative demand (p < .001), 6.6 in work pace (p = .003), and 4.6 in emotional demands (p = .017). Those working on units with a shorter LOS also tended to have greater work demands than those
with a medium LOS, but the difference was not significant (data not shown).

Gender, marital status, and years of RN experience were associated with work demands. Women (vs. men) nurses perceived a higher work pace and emotional demands; married (vs. not) nurses perceived fewer emotional demands. Nurses with 3 to 6 years of RN experience reported greater emotional demands than those with 6 or more years of RN experience. No nurse characteristics were associated with quantitative demands.

**Relationship of Work Demands to Health and Job Outcomes**

Table 4 provides regression coefficients and odds ratios from linear or logistic regression analyses with multilevel modeling. Quantitative demands and emotional demands were significantly associated with all health and job outcomes; emotional demands tended to have greater estimates (i.e., absolute values) than quantitative demands. Greater quantitative and emotional demands were associated with reporting poor health, greater sleeping troubles, work–family conflict, stress and burnout, lower job satisfaction, and a greater intent to leave. A higher work pace was also significantly related to greater work–family conflict.

**Discussion**

This study reports that nurses had high levels of work demands and poor job outcomes relative to other occupations. Nurses in this study had similar mean scores of 62 points in both quantitative and emotional demands, as compared to mean scores of 51 to 61 in quantitative demands and 59 to 64 in emotional demands among nurses in other countries (Aust et al., 2007; Malloy & Penprase, 2010; Nübbling et al., 2010). However, the nurses in our study reported a higher work pace (mean = 77.8) than mail carriers (mean = 73.4), who had the highest score among 56 job groups in a study conducted by Pejtersen et al. (2010). Nurses also had a higher mean score of 73.5 in work–family conflict than primary and secondary school teachers (mean = 43.1) and managers in the private sector (mean = 43.3), which were the job groups with the highest scores among 56 job groups (Pejtersen et al., 2010). When compared with Korean office workers (June & Choi, 2013), the nurses in our study had 13.3-, 18.3-, and 22.5-point higher means in quantitative demands, work pace, and emotional demands, respectively. The greatest difference, of 37.1 points, was found in burnout between nurses (mean = 71.1) and office workers (mean = 34.0). Job satisfaction, however, was similar between nurses (mean = 50.8) and office workers (mean = 53.7). These findings suggest that nurses work in a poor psychosocial work environment, which needs to be improved in the future.

We also found considerable variations in the psychosocial work environment among nursing units within the same hospital. Quantitative demands and work–family conflict had the greatest differences (30 points and 31.4 points, respectively) between the units with the lowest and highest scores. Great variations among units also existed in the proportions of nurses who rated their health as poor (range 0–42.1%) and intended to leave (range 5.6–68.4%). This finding indicates that, even within the same organization, nurses could be exposed to different work environments on their working units, and these heterogeneous work environments may cause unit-level differences in patient and nurse job outcomes (Boev, 2012; Cho, Mark, Yun, & June, 2011; Van Bogaert,
Clarke, Roelant, Meulemans, & Van de Heyning, 2010). Duffield et al. (2011) also reported that unit-level work environments were much more variable than those at the state or hospital level. This suggests that providing a quality work environment and managing the nursing workload may be effectively achieved at the unit level. Nurse executives and unit managers should examine what could create those variations and ultimately implement managerial actions to reduce the differences.

The highlight of the study findings was a significant relationship between the LOS and work demands. Working on units with a short or medium (vs. long) LOS was associated with increases in quantitative demands, work pace, and emotional demands. This finding supports the argument that a reduced LOS increases the intensity of nursing care because more complex care is compacted into fewer days (Aiken, 2008). This would suggest that as the LOS is reduced continuously over time, work demands simultaneously increase. Nurse managers and researchers need to examine the influence of the shortening of the LOS under the pressure of national and hospital policies (e.g., DRGs) on nurse workloads, and request hospital and government authorities to increase nurse staffing to meet the increased work demands. Such an examination will require an in-depth analysis that can quantify the effect of a decrease in LOS on increases in nursing hours per patient day and additional nurses required, preferably on the basis of longitudinal observations. For example, Shamian et al. (1994) reported that on average, a 1-day decrease in the LOS required an additional 0.422 hr per patient day or 12.66 hr per day on a 30-bed unit.

The impact of the LOS on work demands continues to influence nurses’ health and job outcomes. Greater quantitative and emotional demands were associated with poor health and job outcomes. A higher work pace was also related to greater work–family conflict. These findings are consistent with those from previous studies reporting that a shorter LOS and higher work demands were associated with negative health and job outcomes. Excessive work demands and inadequate staffing (e.g., a higher number of patients per nurse) were associated with job dissatisfaction and burnout (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Lu et al., 2012; Rafferty et al., 2007). Heavy workloads were reported to cause deterioration in the emotional and mental health of nurses (e.g., stress and burnout). Increasing workloads and inadequate staffing were also associated with an intent to leave and turnover (Cho et al., 2009; Hayes et al., 2012). A high work pace and psychological work demands were reported to exacerbate sleep impairment and chronic maladaptive fatigue, which affect nurses’ health and well-being (Winwood & Lushington, 2006). Work overload was associated with higher work–family conflict, which was linked to lower job and life satisfaction (Yildirim & Aycan, 2008). These findings suggest that work demands should be maintained at the level that nurses can manage in order to prevent nurses’ health and job outcomes from deteriorating.

Another interesting finding was that quantitative demands were more influenced by the LOS than emotional demands, but emotional demands tended to have greater impacts (i.e., regression coefficients) on health and job outcomes than quantitative demands. Although not examined in this study, we speculate that quantitative demands could have a greater impact on patient outcomes, whereas emotional demands would be more influential for nurse outcomes. Increasing quantitative demands and a greater work pace due to a shorter LOS could threaten patient safety and outcomes because nurses may have to work faster under time pressure, which could increase the risk for committing errors and violations of standards of nursing care. Recent studies have reported that high patient turnover due to a shortened LOS was significantly associated with increased medication errors and mortality (Duffield et al., 2011; Needleman et al., 2011). Park, Blegen, Spetz, Chapman, and De Groot (2012) also reported that higher nurse staffing was associated with a lower failure-to-rescue, and the beneficial effect of nurse staffing on patient outcomes was reduced as patient turnover increased.
There are limitations to this study. First, this study was conducted in a tertiary university hospital in a capital city. Therefore, the study findings may not reflect the relationships among LOS, work demands, and nurse outcomes in other hospitals, especially small, rural hospitals. Second, patients’ clinical characteristics and nursing care intensity, which could explain work demands, were not examined in this study. We included the type of nursing unit as a variable that could reflect patient characteristics, but it might not be able to capture the impacts of patient characteristics on work demands and nurse outcomes. Further studies examining how those factors influence work demands and nurse outcomes would enhance our understanding of their relationships. Third, the study findings were obtained from a cross-sectional design and thus were not able to show the impact of changes in the LOS on work demands over time. Longitudinal studies are expected to improve the understanding of how and the extent to which a reduced LOS would cause an increase in work demands and influence nurse outcomes over time within a nursing unit or hospital.

Implications for Practice and Future Research

Our findings are expected to be generalizable to other countries whose healthcare systems are implementing any type of policy to reduce hospital costs by shortening the LOS as well as those establishing a prospective payment system (e.g., DRGs). However, reductions in the LOS and their impacts on work demands and nurse outcomes may be influenced by various factors, including the availability of subacute and long-term care settings for patients discharged from acute care hospitals, and the skill mix of nursing staff and their responsibilities for providing nursing care based on the division of labor between nurses and assistive personnel.

In conclusion, we report that nurses perceived high work demands and poor health and job outcomes. A shorter LOS was associated with higher work demands, and higher work demands were associated with worse nurse outcomes. To the greatest extent possible, nurse managers should prevent work demands from inflating to improve nurses’ psychosocial work environment. Ongoing research is required to evaluate changes in the LOS over time and their impact on work demands and nurse outcomes. If an inverse relationship between the LOS and work demands is found, then the number of additional nurses required to meet increasing work demands should be quantified and requested from the hospital and government authorities. Ultimately, financial incentives gained by reducing the LOS should be returned to and invested in their rightful “owners,” who are the nurses who provided more complex nursing care in a shorter period of time.

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Clinical Resources

- COPSOQ International Network: http://www.copsoq-network.org

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